

Root Cause Analysis

Capturing needs from real-time events

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AWOC - Facilitator Course
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Overview

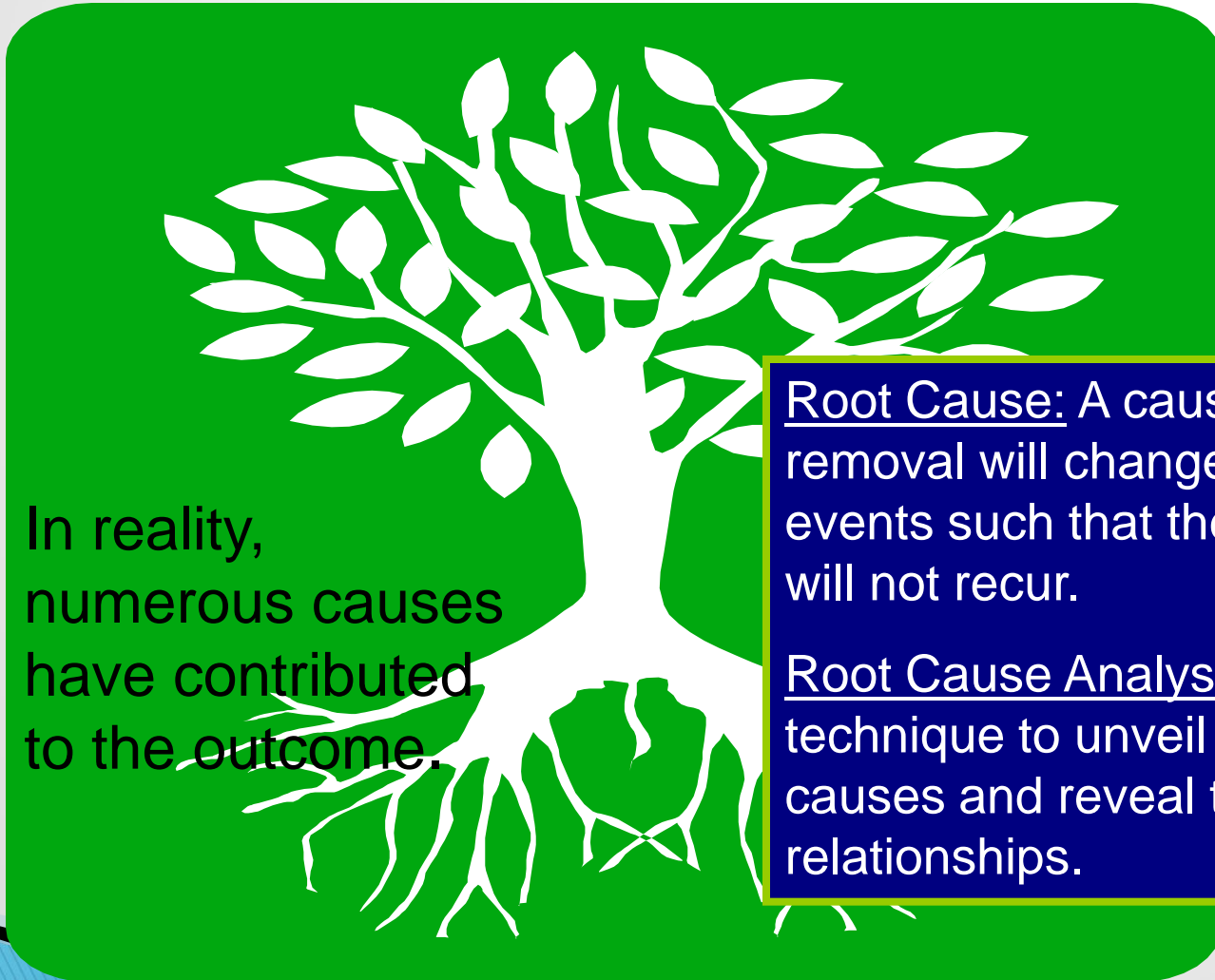
- ▶ Why RCAs?
- ▶ Summary from AWOC
 - Yes we did something with all of those!
- ▶ RCA – your office?
- ▶ RCA Toolkit
 - ▶ Working together

Root cause?



Name seems to imply one thing
led to all things

Root(s) Cause(s) Analysis

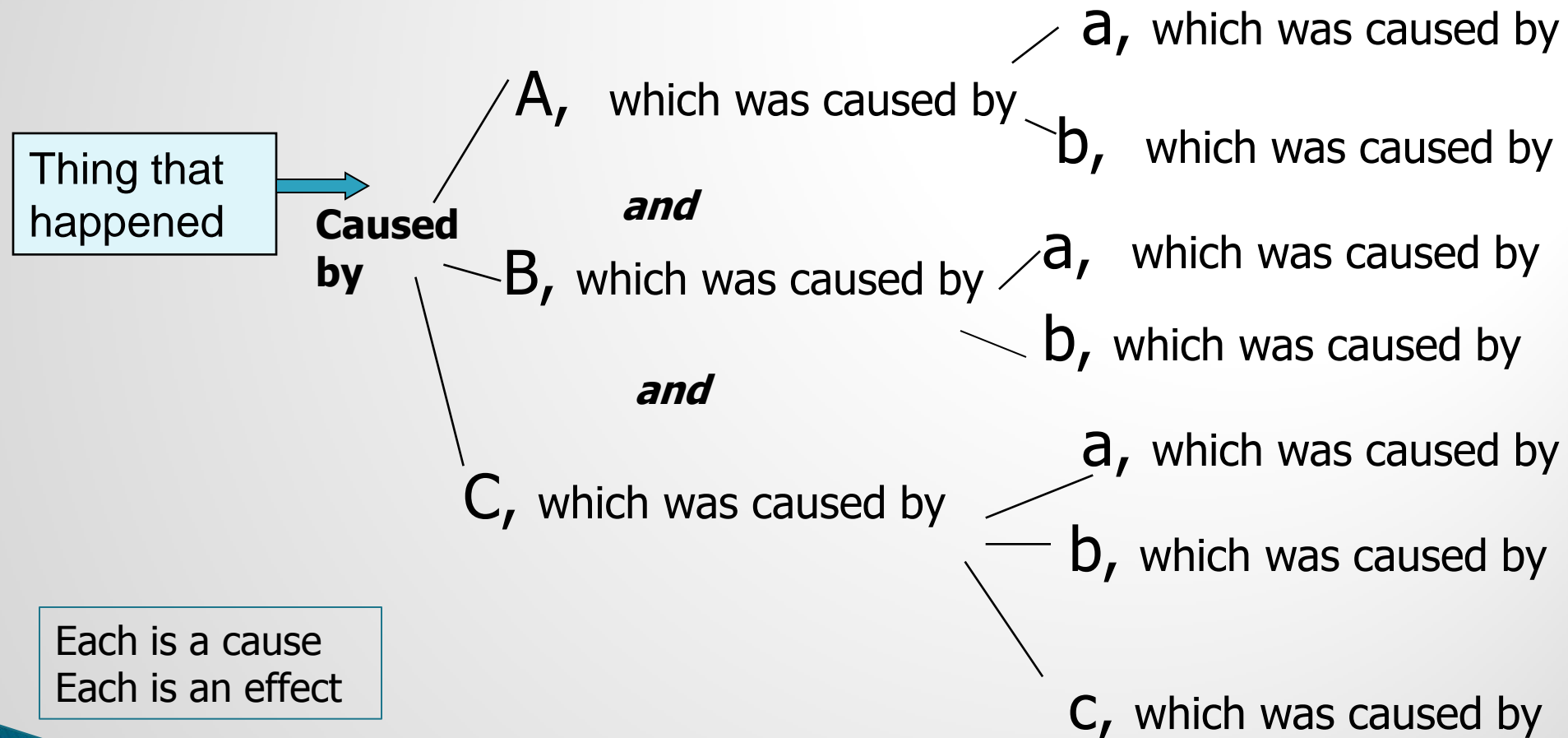


In reality,
numerous causes
have contributed
to the outcome.

Root Cause: A cause whose removal will change or control events such that the incident will not recur.

Root Cause Analysis: A technique to unveil these causes and reveal their relationships.

Recall one example of how a root cause analysis works



Critical to RCA Success

Industry (and WDTB) Lessons

- ▶ Agreed upon purpose for doing RCAs
 - *Improvement of the process*
 - *NOT to find blame on individuals*
- ▶ Honesty is crucial
 - *Trust must be established*
 - *Anonymity must be guaranteed*
 - Amnesty International
- ▶ Independent Evaluation
 - *ASRS Database hosted at NASA*

If this is not established and believed, don't bother!

Value of an RCA...*Not the blame game!*



“We have learned the futility of trying to *understand* when people are afraid of *blame*.”

B. Nelms, FAILSAFE Network

A basic philosophy



**“What is it about
the way I am
that contributed
to this event,
and
what do
I intend to do
about it?”**



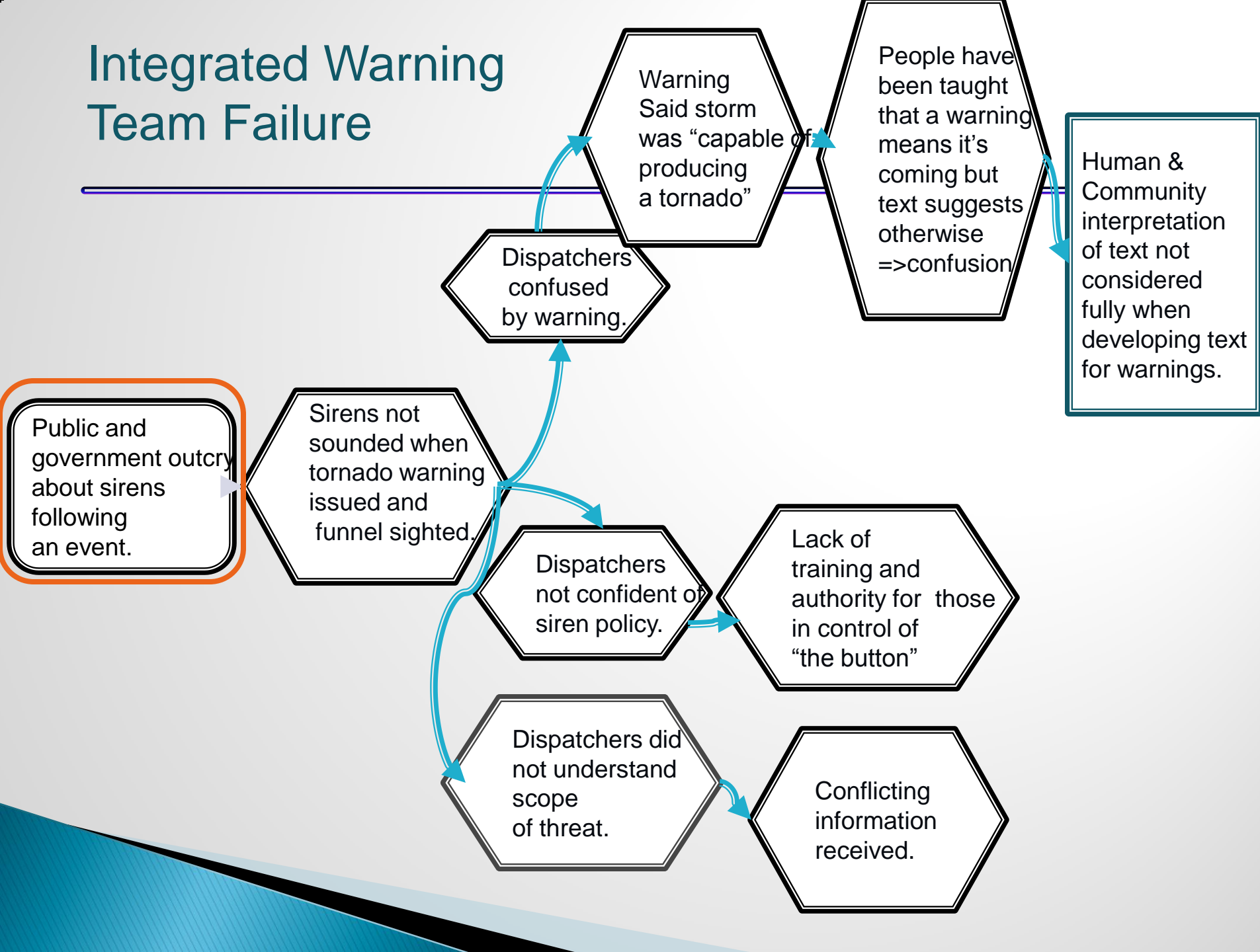
Bob Nelms, Failsafe Network

First - Some sample RCAs

- ▶ I really liked these – Why?
 - *Honest*
 - *Included partners*
 - *Self reflective*

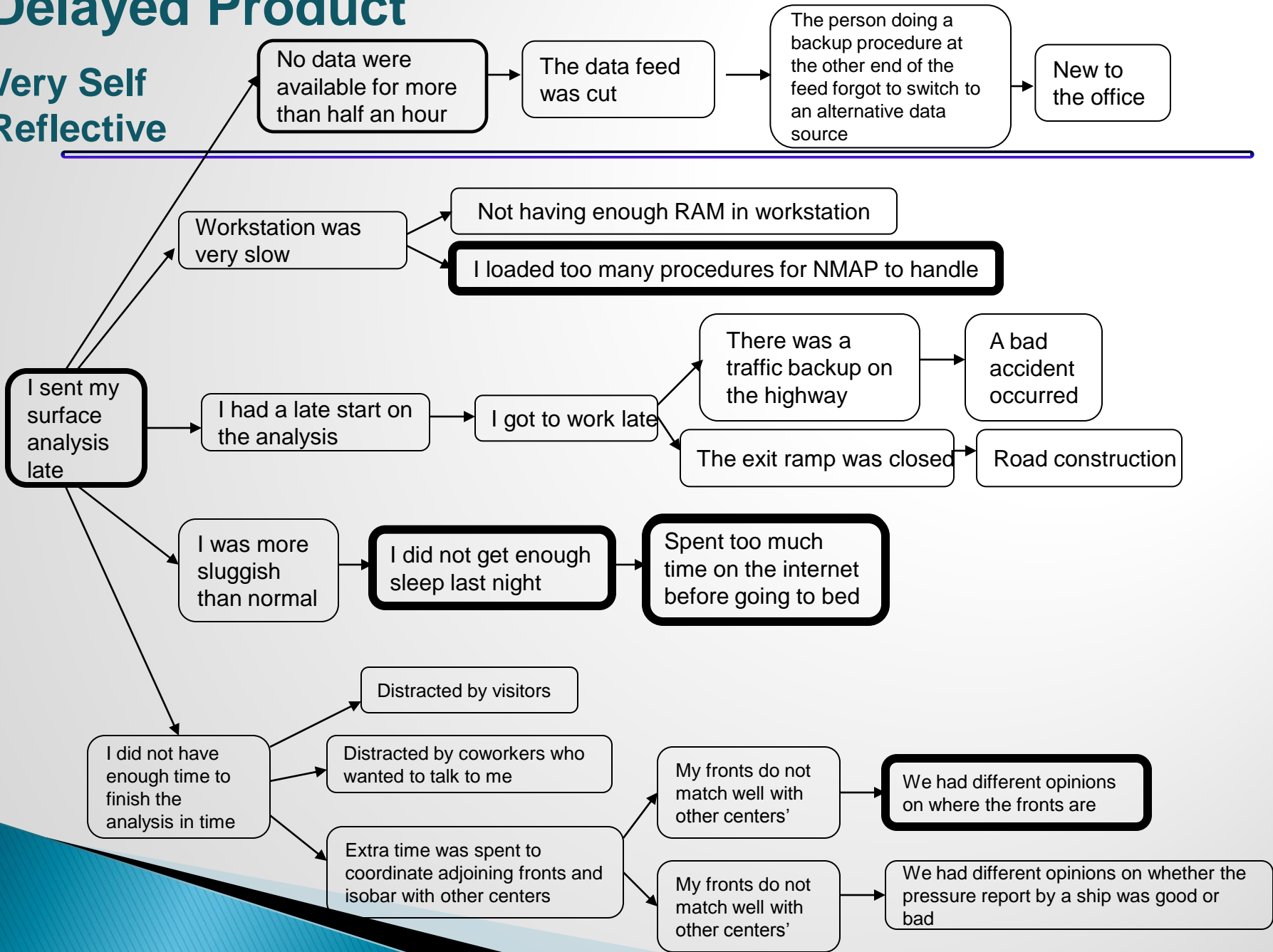


Integrated Warning Team Failure



Delayed Product

Very Self Reflective



AWOC Summaries...national

- ▶ From AWOC Submissions
- ▶ NWS Forecasters
- ▶ 2004-2009
- ▶ Forecaster chooses topic from their experience
- ▶ Anonymity
- ▶ We're not "experts"

Database of Submissions

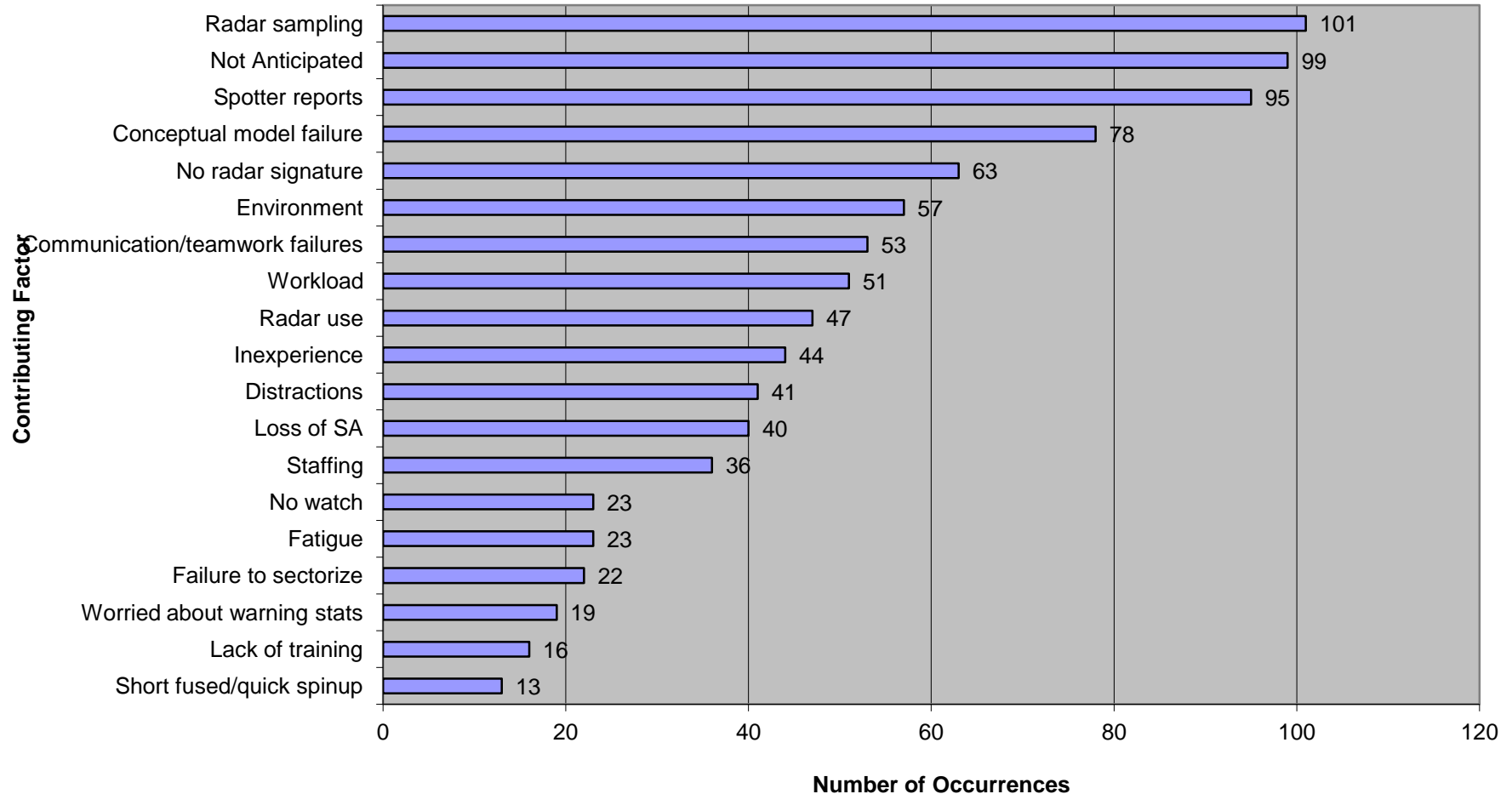
Terminology (For missed events)

- ▶ “Not anticipated, No threat perceived”
 - *Threat is not expected*
 - *Science*
- ▶ “Conceptual Model Failure”
 - *Failed to apply correct conceptual model*
 - *Didn't understand known conceptual model*
 - *Training, loss of SA, other*
- Spotter Reports
 - *Lack of , conflicting, erroneous*

Missed Tornadoes

2004-2009

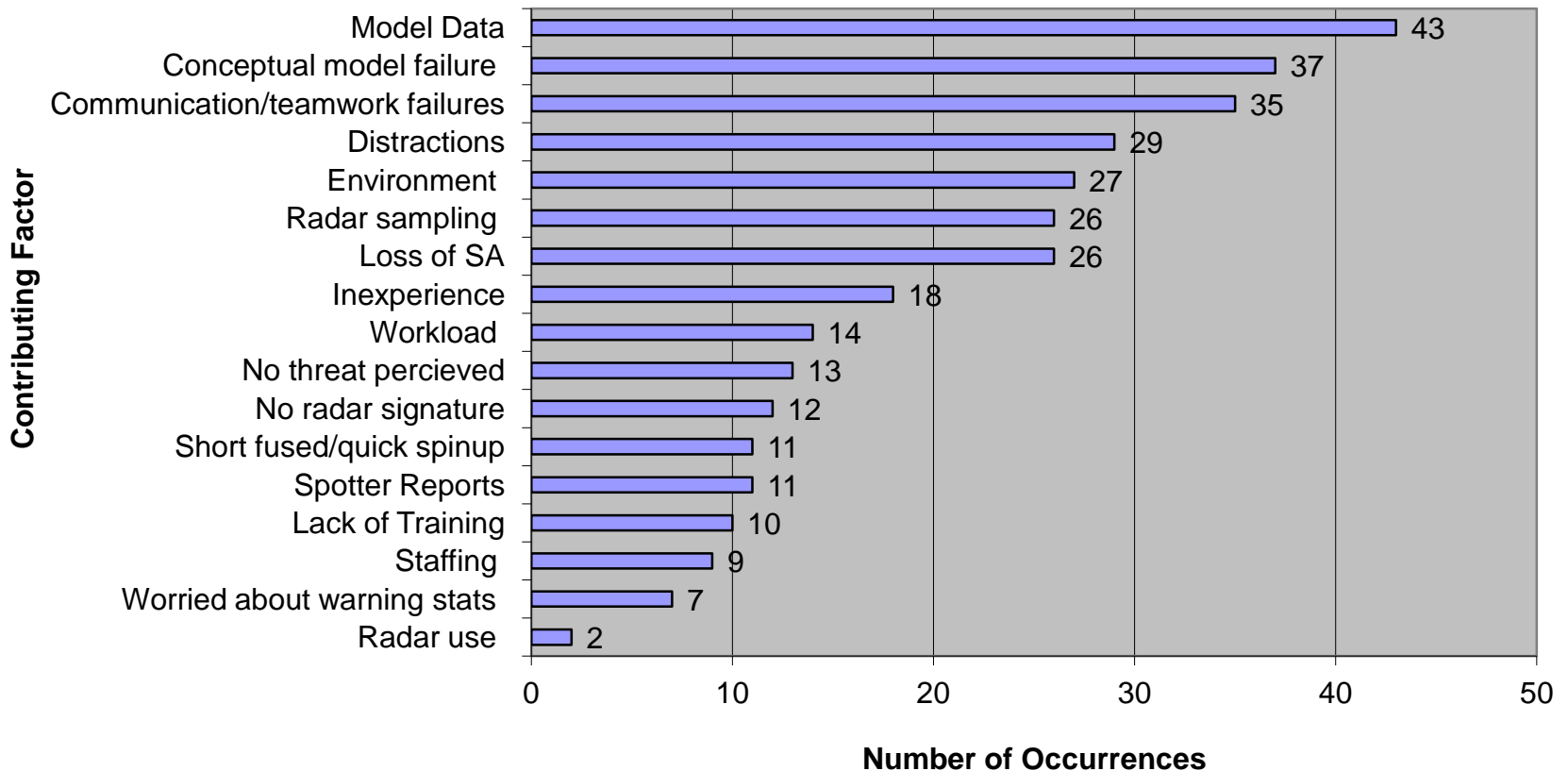
146 RCA Missed Tornadoes 2004-2009



Missed Snowfall

2004-2009

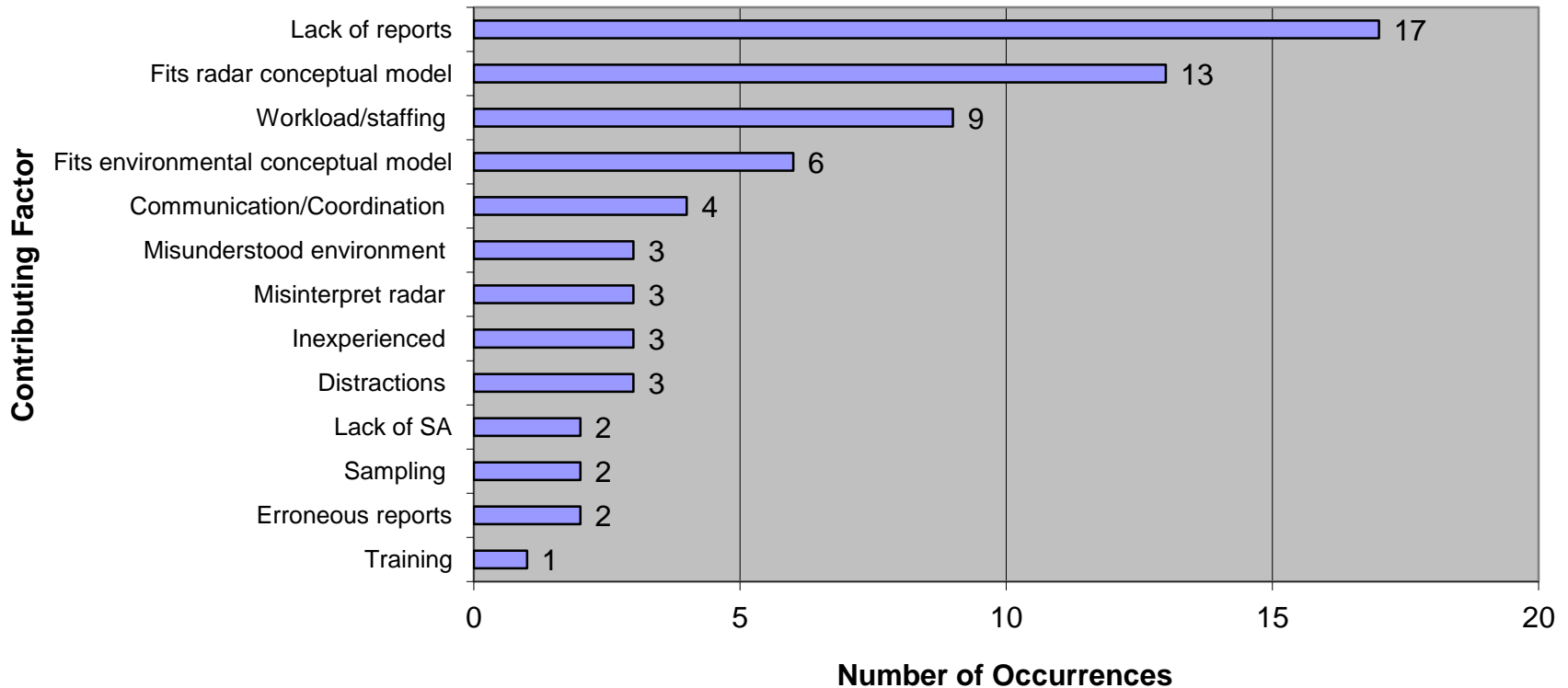
89 RCA Missed Snowfall Events 2004-2009



False Alarms – Wind

2004-09

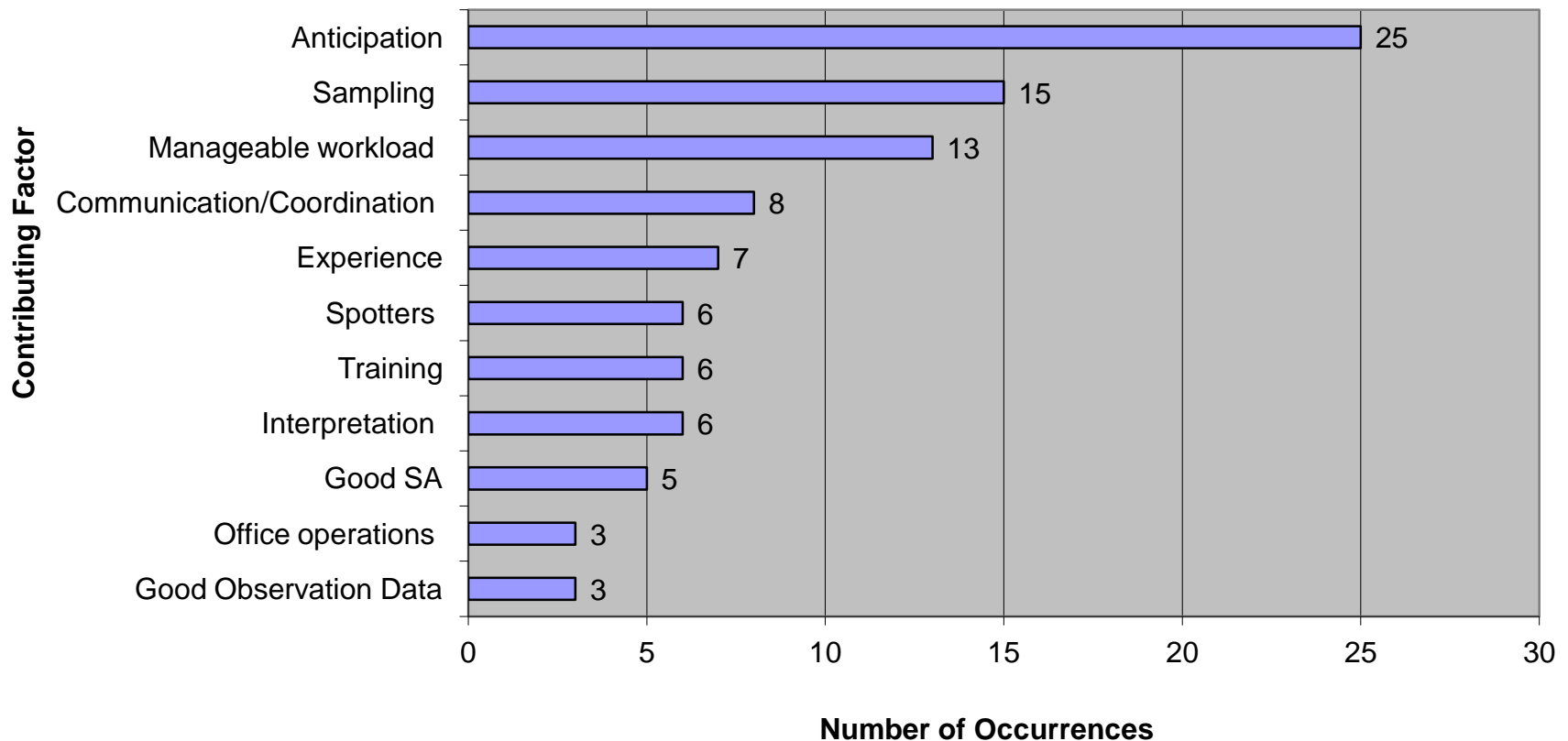
15 RCA Severe Tstm (Wind) False Alarms 2004-2009



Positive Lead Time – Tors

2004-2009

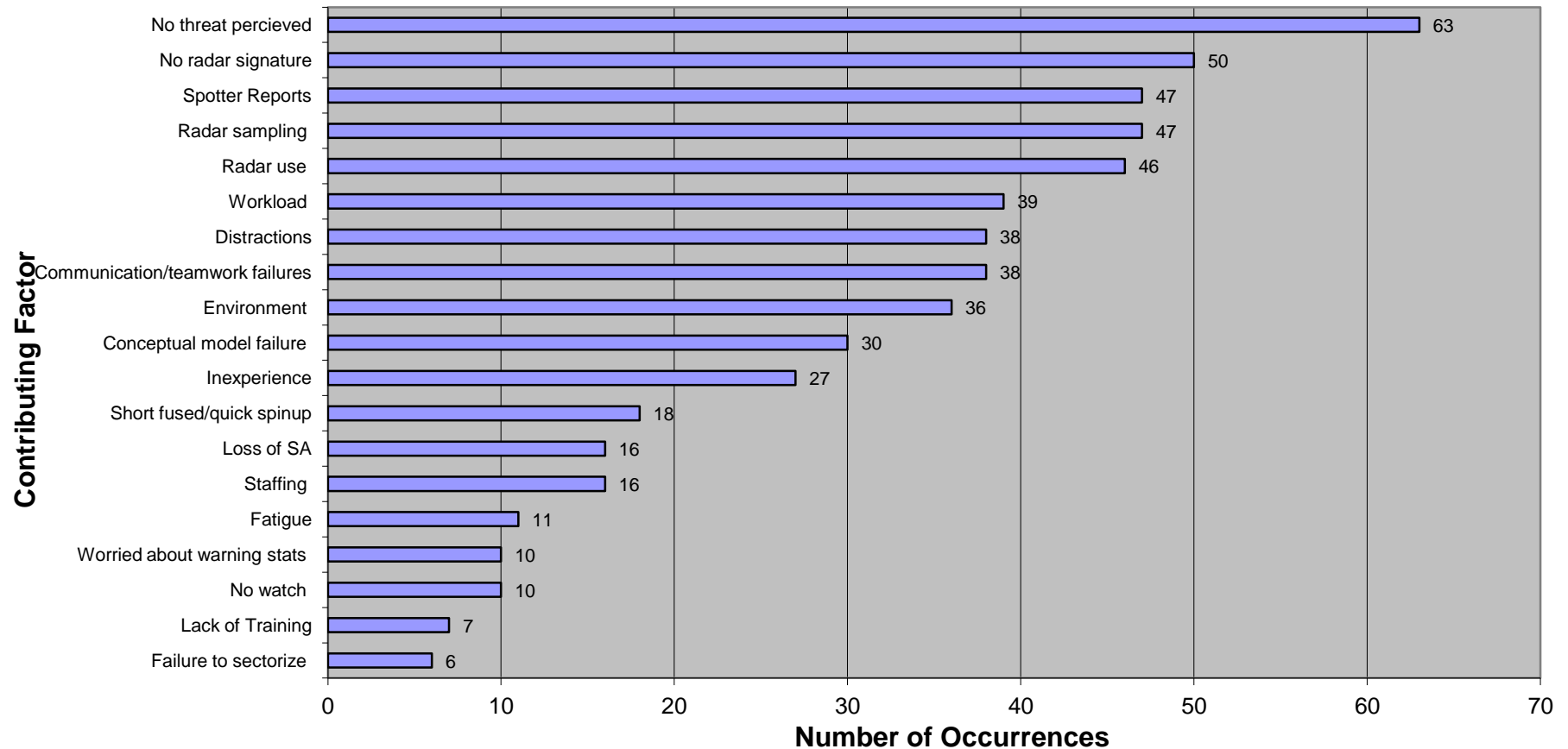
19 RCA Verified Tornado Events 2004-2009



Missed Wind Events

2004-2009

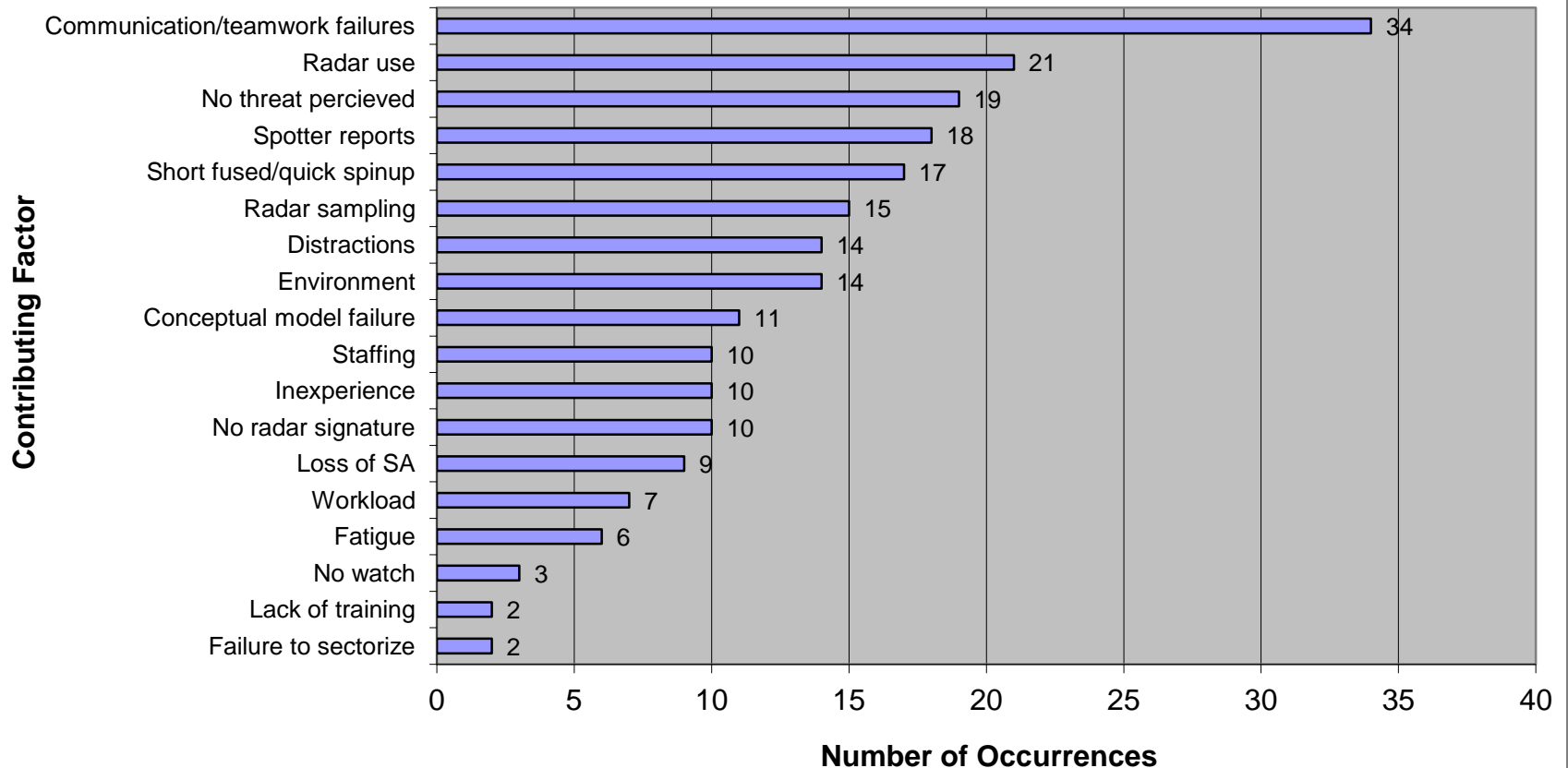
133 RCA Missed Tstm Wind Events 2004-2009



Missed Hail Events

2004-2009

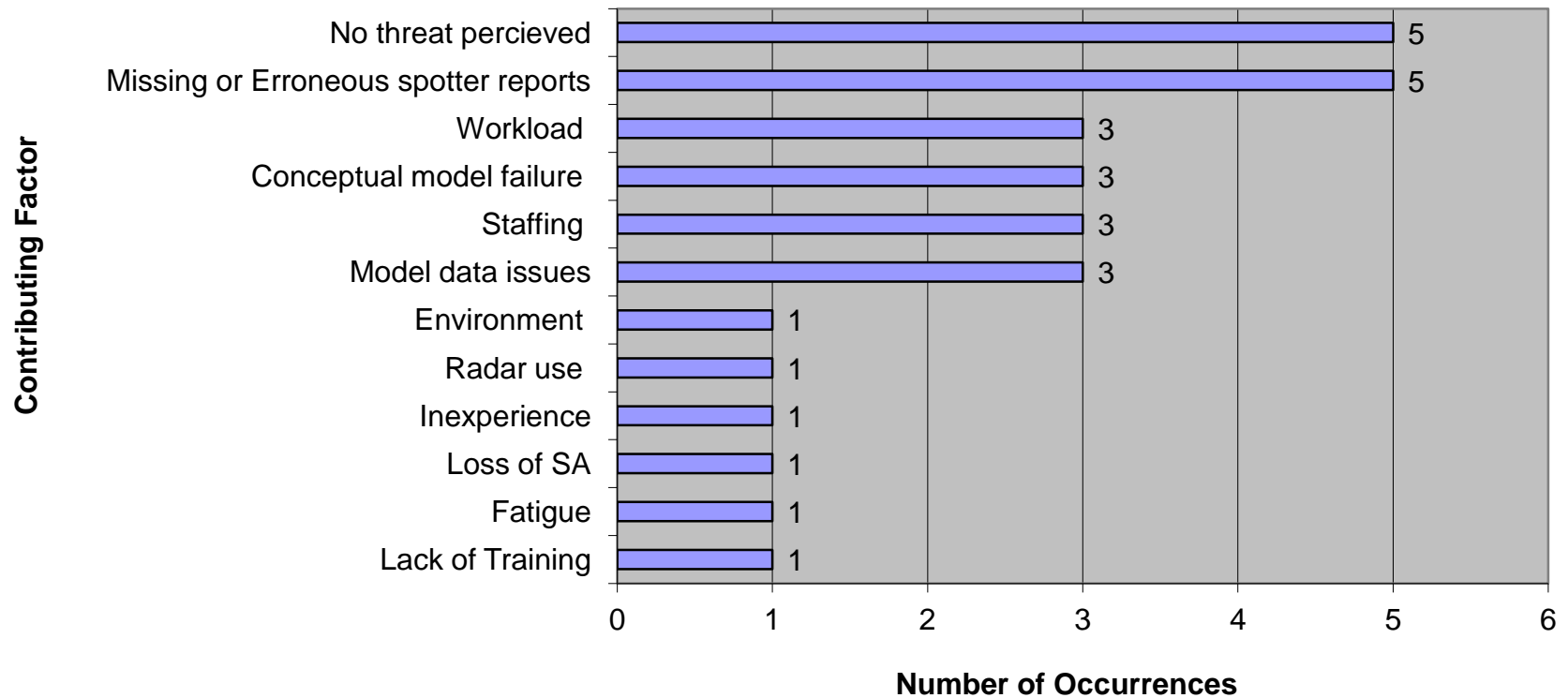
50 RCA Missed Hail Events 2004-2009



Missed Freezing Rain

2004-09

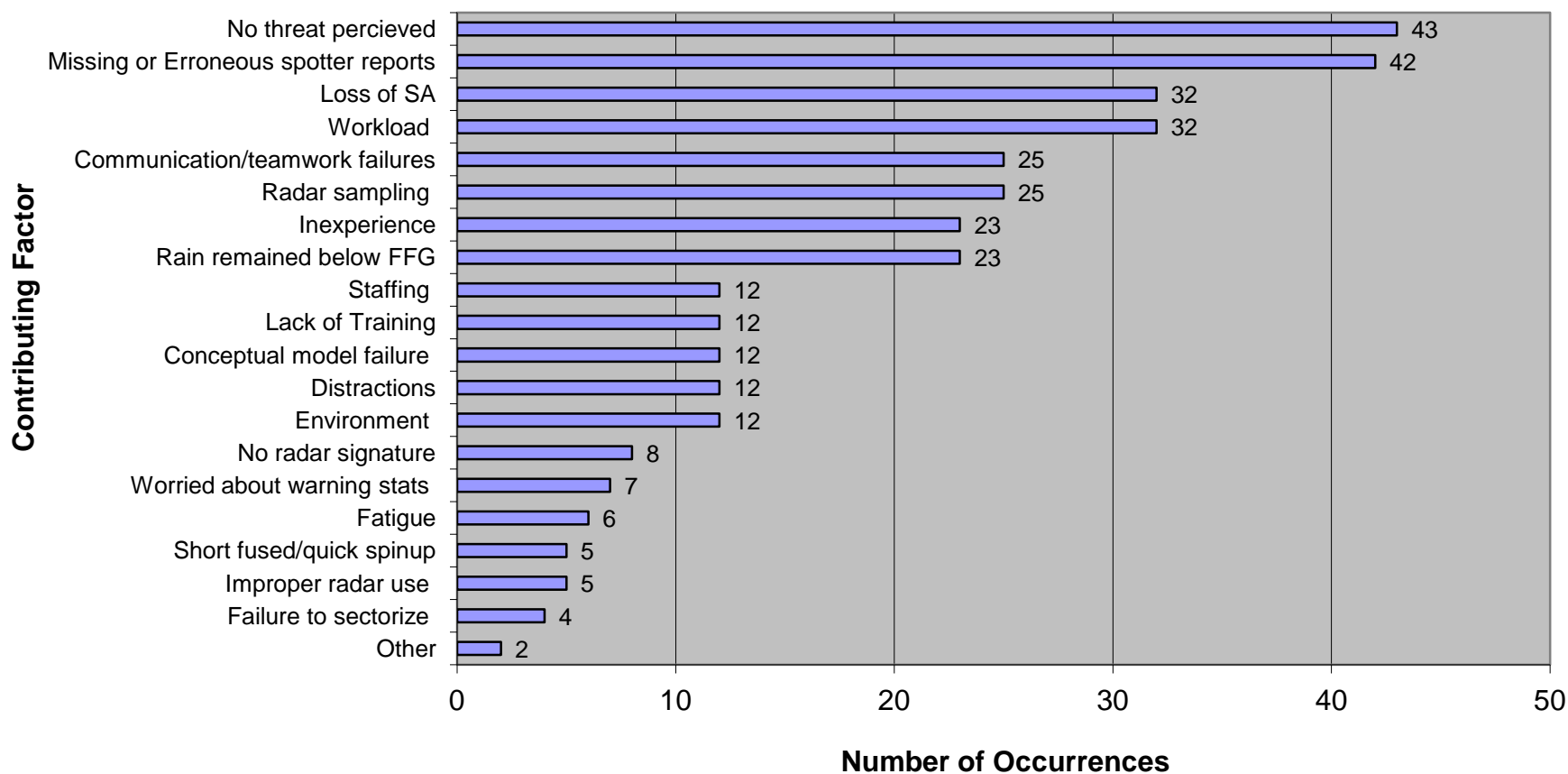
9 RCA Missed Freezing Rain Events 2004-2009



Missed Flash Flood Events

2004-2009

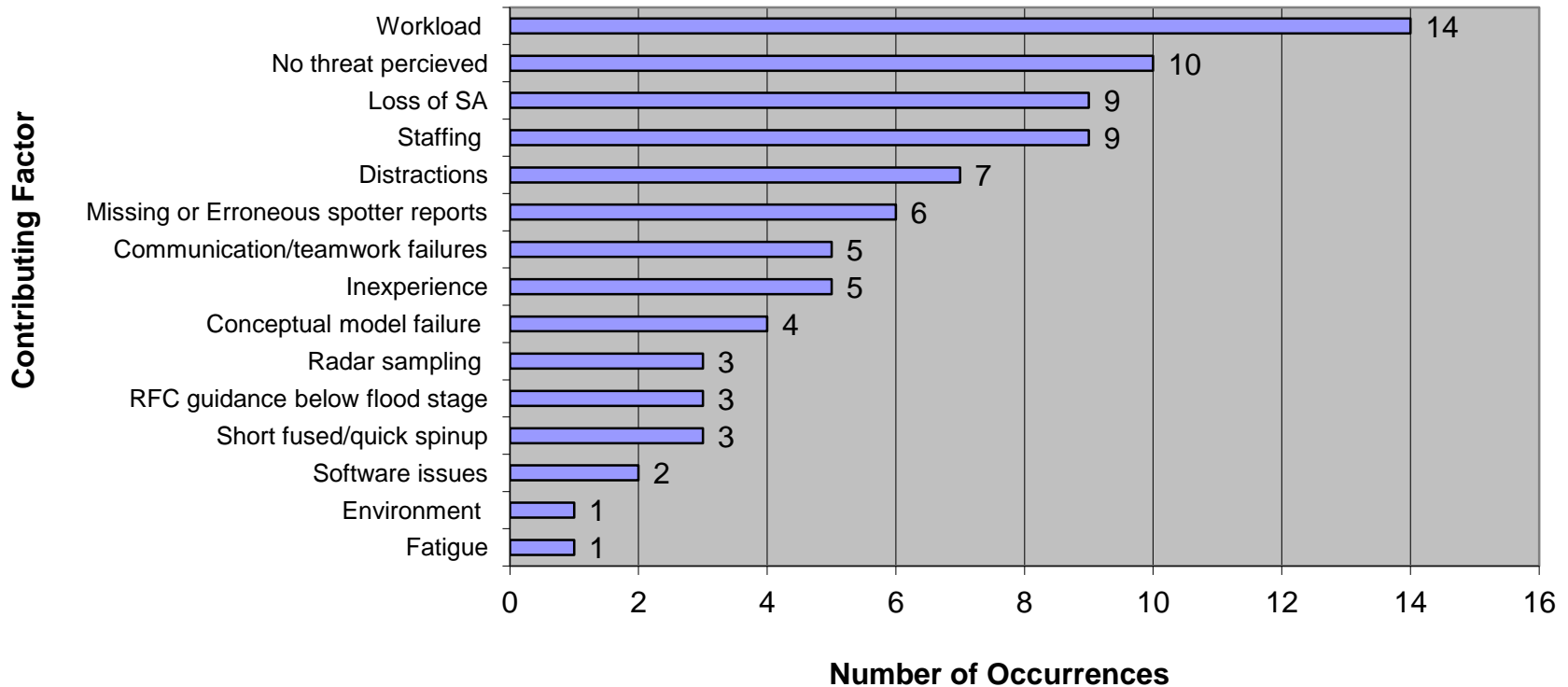
90 RCA Missed Flash Flood Events 2004-2009



Missed River Flood Events

2004-2009

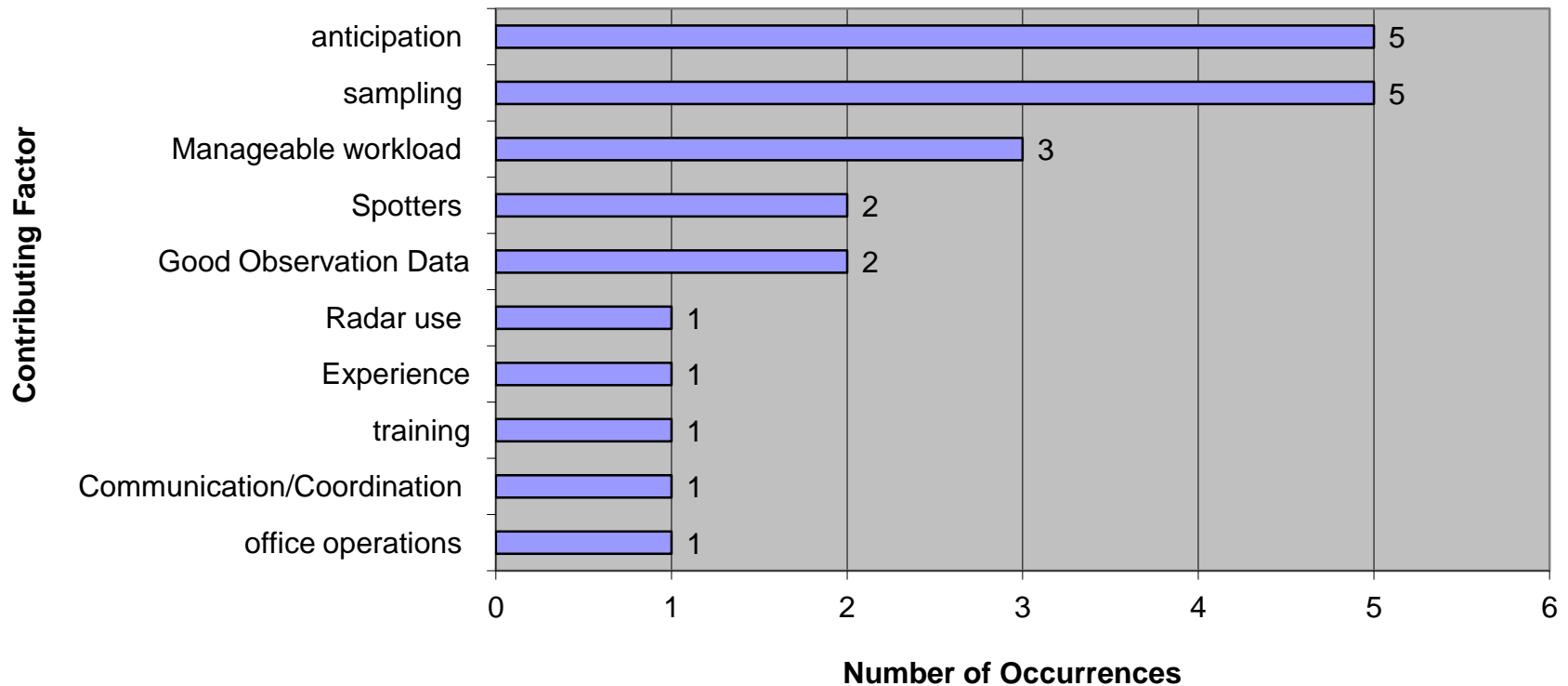
32 RCA Missed River Flood Events 2004-2009



Positive Lead Time – Wind

2004-2009

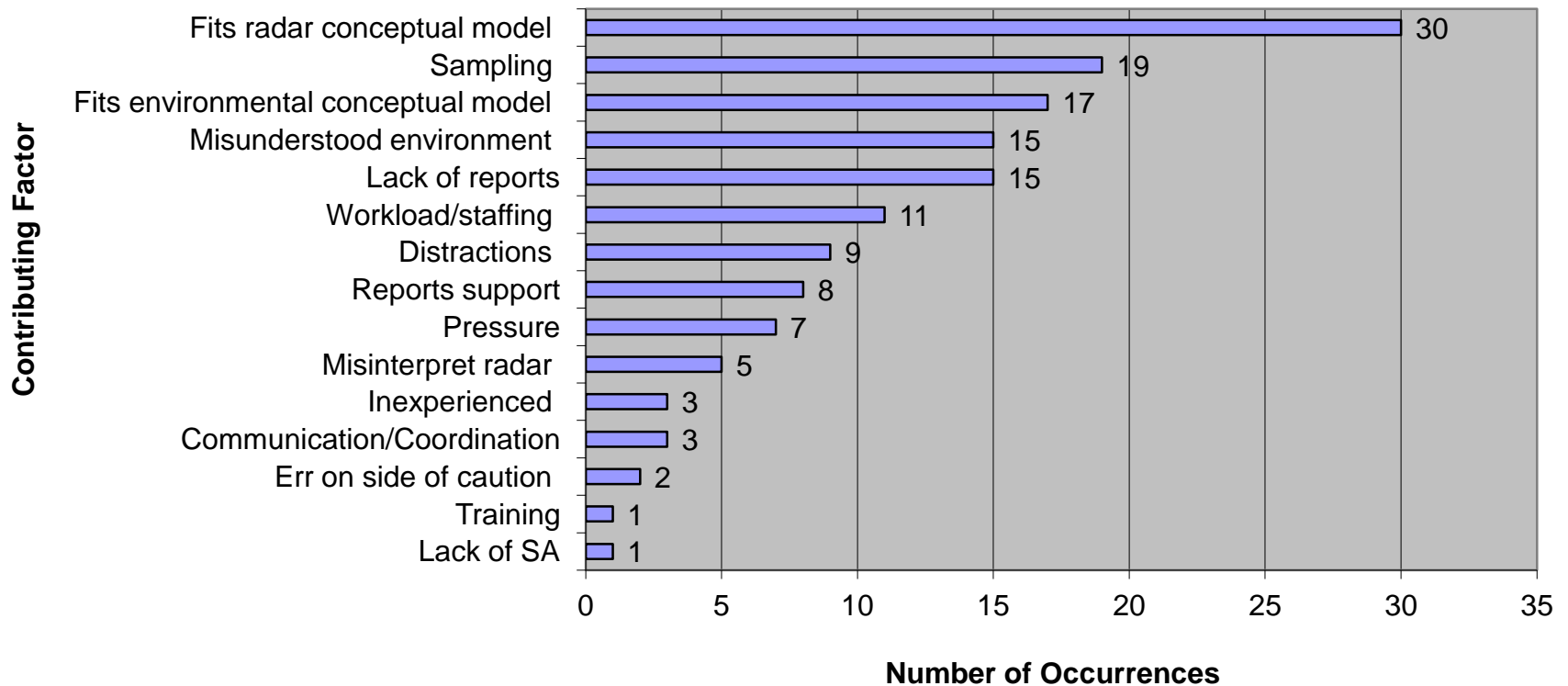
10 RCA Verified Tstm Wind Events 2004-2009



False Alarms – Tornado

2004-09

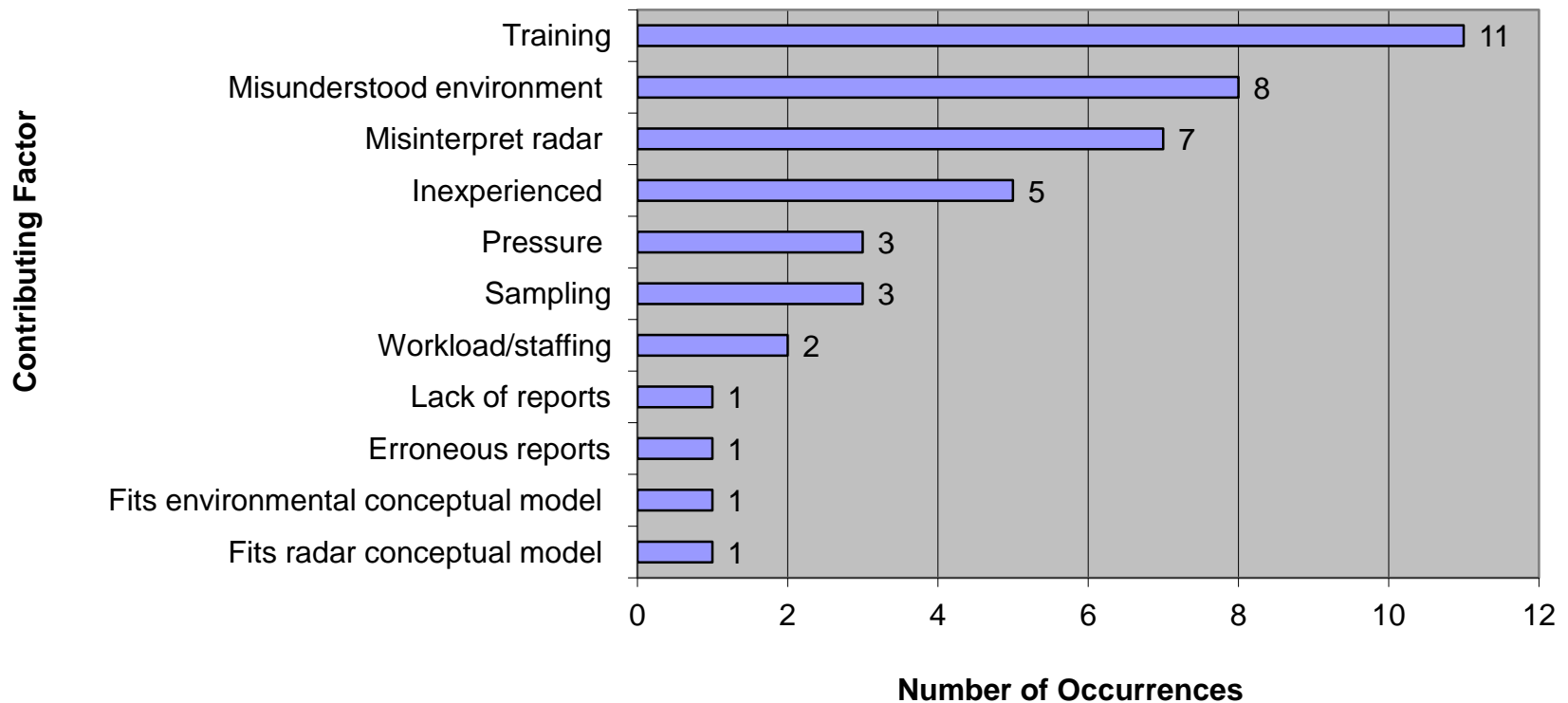
31 RCA's for Tornado False Alarms 2004-2009



False Alarms – Hail

2004-09

13 RCA Hail False Alarms 2004-2009



Applying this at one WFO

- ▶ With a few offices
- ▶ Staff did 1 Positive, 1 Negative RCA
- ▶ Sent to 3rd party to evaluate, report
 - *Trust established*
 - Fostered honesty
- ▶ Designed solutions to address causes

Positive

Tornadoes

Flash
Flood

Wind/Hail

Positive events – commonalities

(regardless of event type)

- ▶ Understood conceptual model, high expectations
- ▶ Proper use of data from all radars
- ▶ Polygons account for expected changes
- ▶ Aware of potential impacts as a staff
- ▶ Good (proactive) comms with partners, lots of SVSs
- ▶ Good ground truth
- ▶ Good comms within offices
- ▶ Workload (enough staff, someone just for flooding, modifying shifts, minimize distractions)
- ▶ SA maximized (duties, shift change, focus on most important duties)
- ▶ Trust and morale high among staff

Negative

Missed Tornadoes

**Missed
Wind**

**Missed Winter
Storm**

**Failure in
Integrated
Warning Team**

**Hail False
Alarm**

Negative events – commonalities

(regardless of event type)

- ▶ Little or no expectations for threat
- ▶ Reluctant or slow to change ongoing forecast
- ▶ Short fused, fast moving
- ▶ No coordinator
- ▶ Office not a team (face threat, duties not followed, no trust)
- ▶ Workload (not enuf staff, too many calls, too many storms)
- ▶ Lost SA (at shift change, distractions)
- ▶ Not familiar with equipment
- ▶ Lack of reference material
- ▶ No spotters
- ▶ Nighttime

Is this really the same office?!

What to you do with this information?

- ▶ Give up – there's no addressing dissociative identity disorder



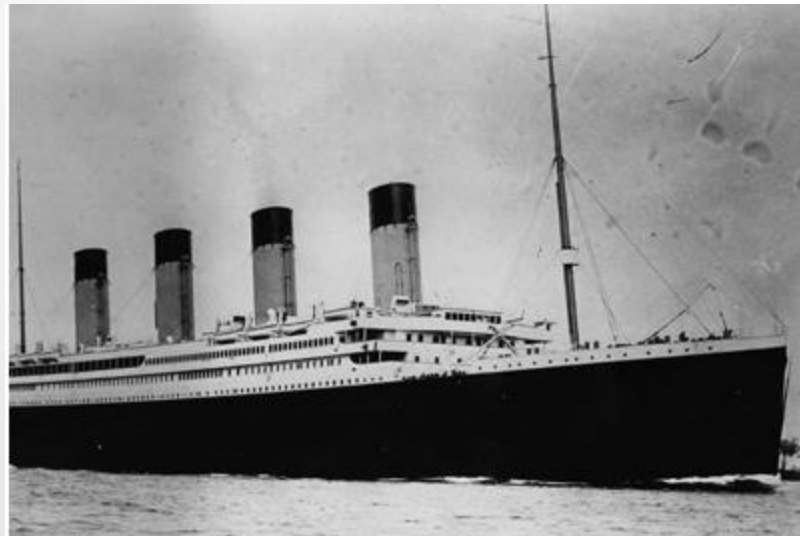
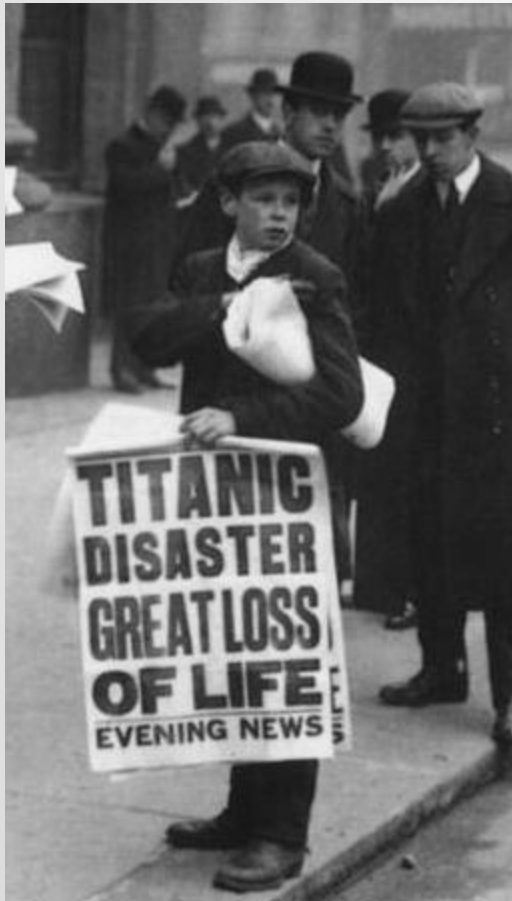
- ▶ Recognize strengths, weaknesses
 - *You can't fix (or model) what you are not aware of*
 - *Design training around training issues*
 - *Modify operations where needed*
 - *Sink or swim together*



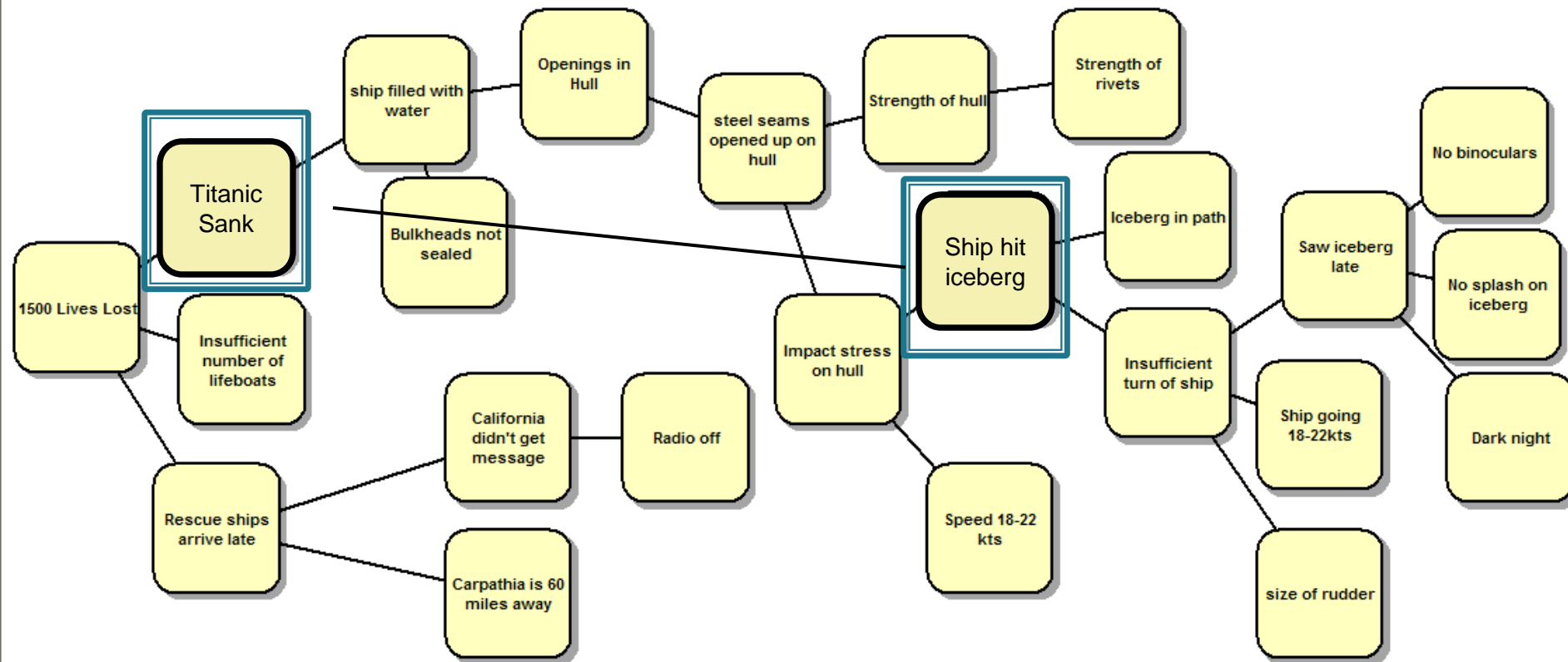
RCA – What to investigate:

April 14, 1912

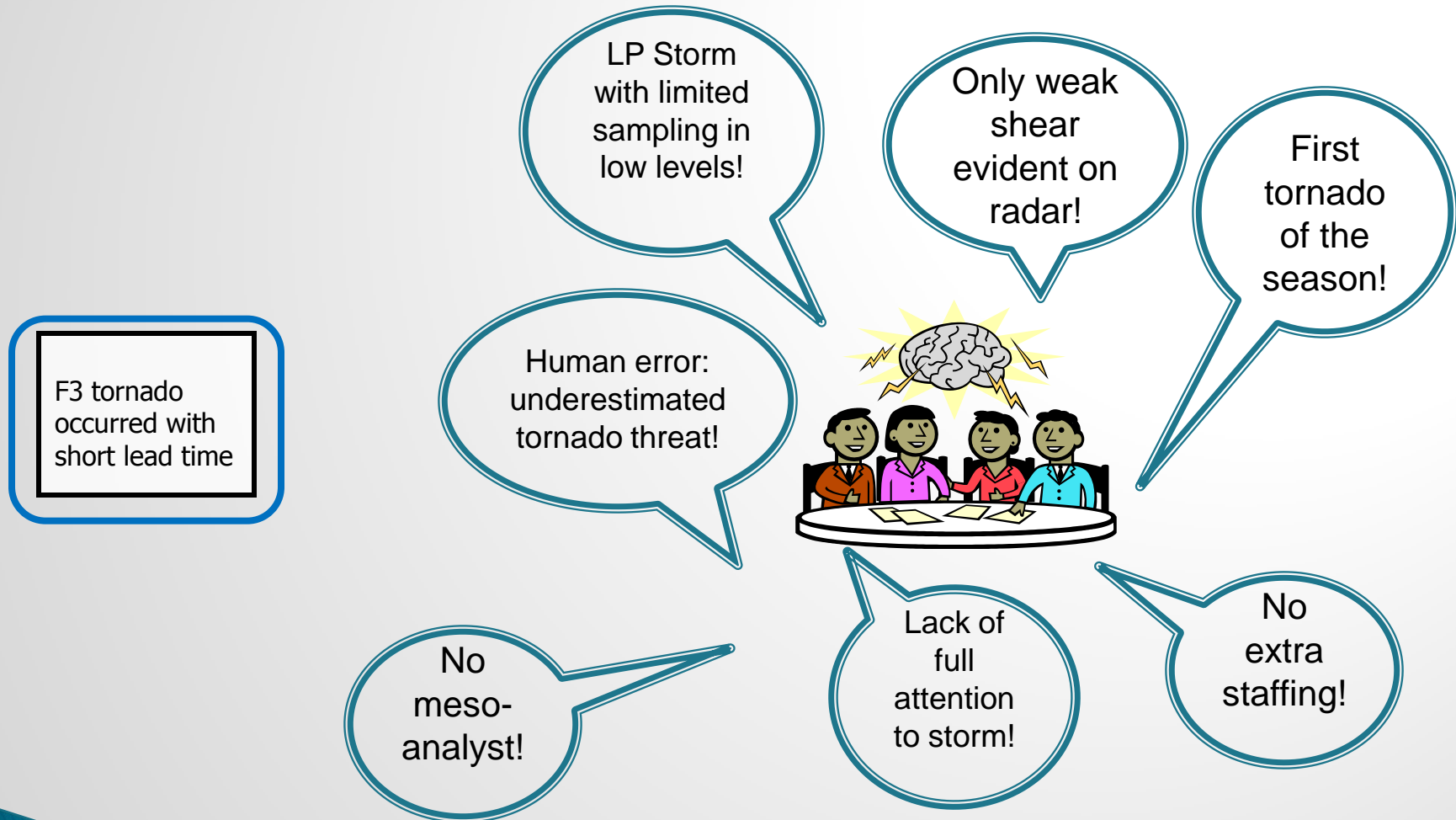
- ▶ Ship sank
- ▶ Hit iceberg



Boat met iceberg...and some other stuff

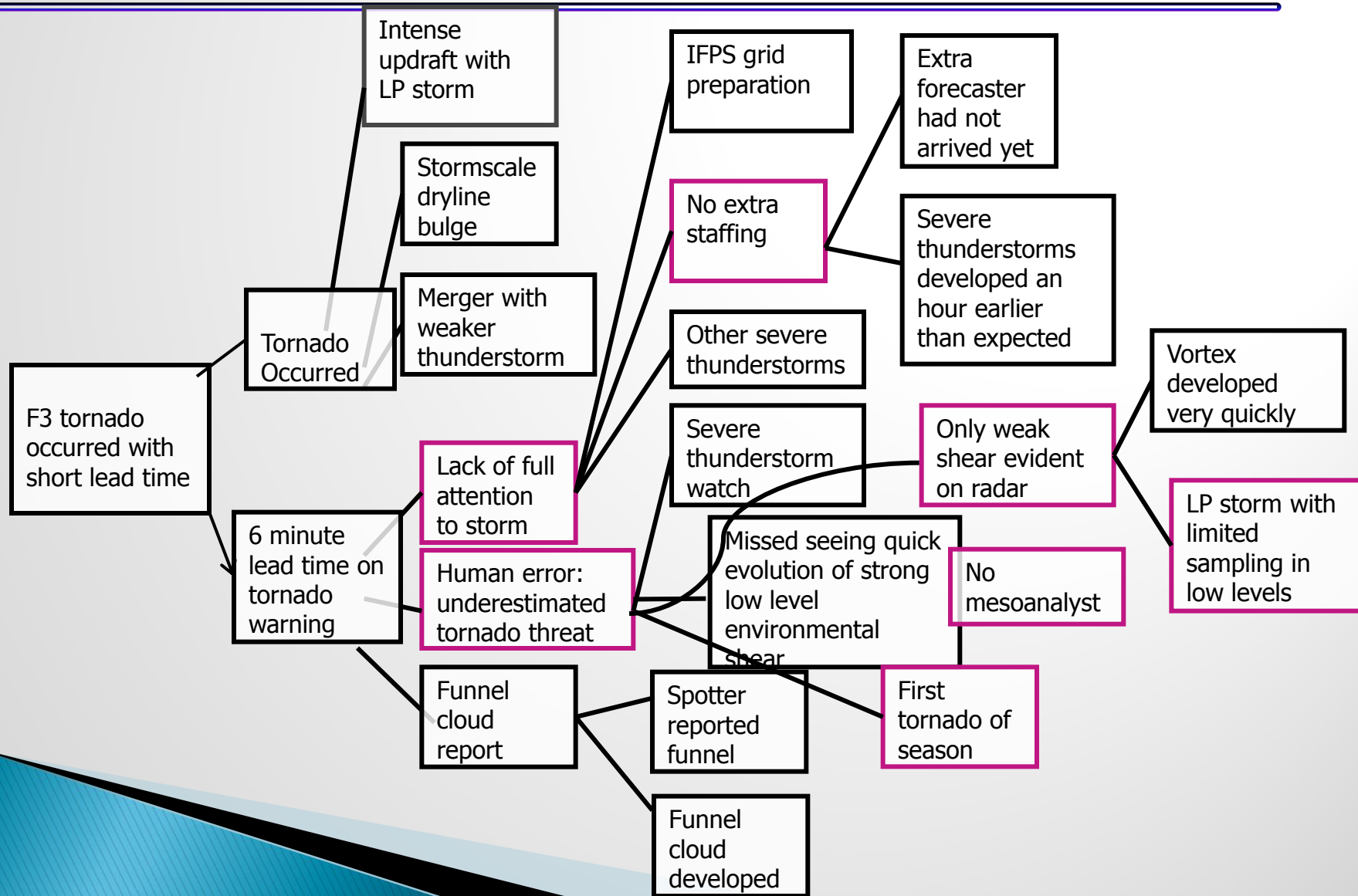


Group RCA – “I’ll tell you what the problem was!”



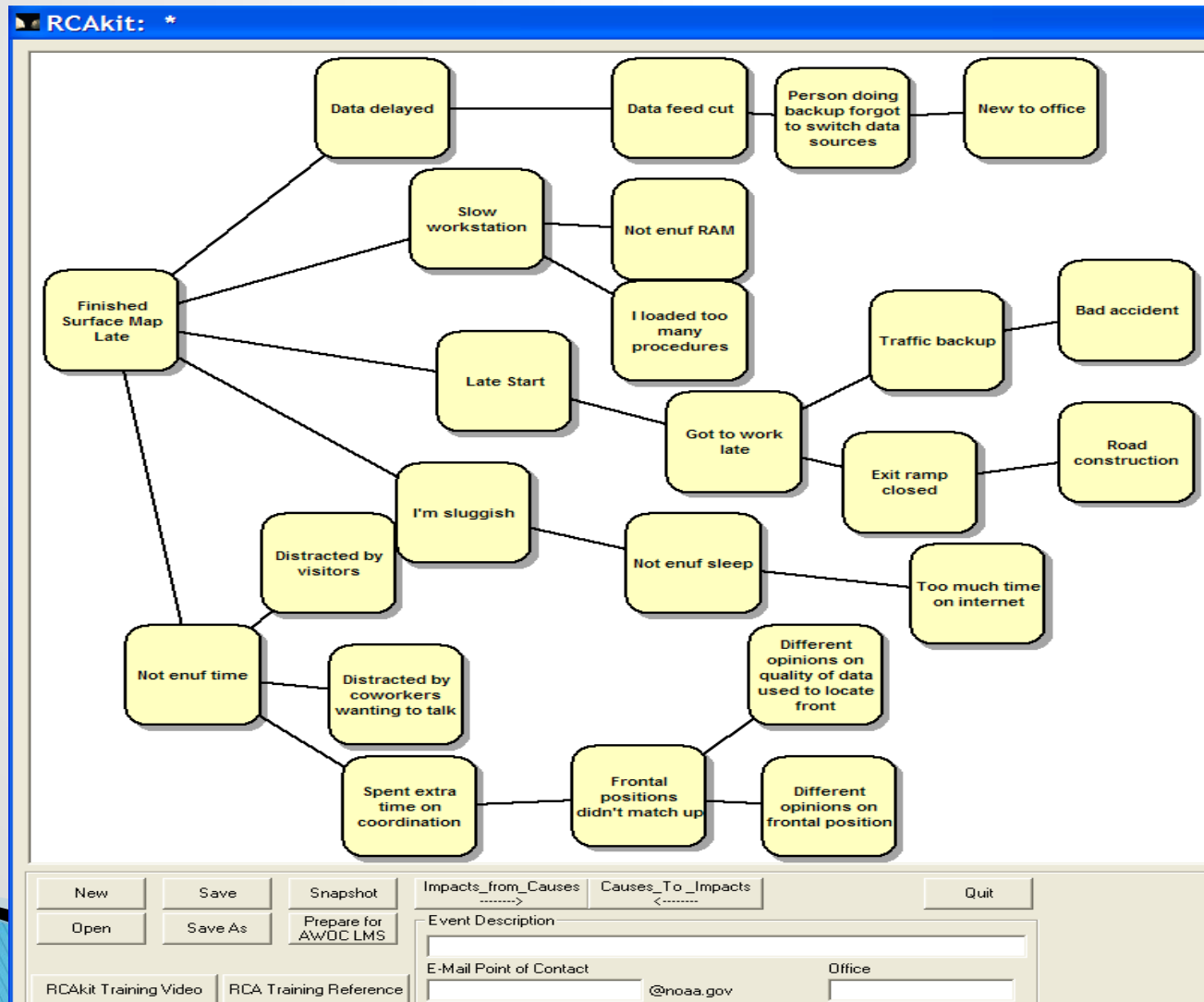
YES! And also.....

All of these as well....



WDTB RCA Toolkit

Locally designed for AWOC



Facilitated RCA - Group Exercise

- ▶ Watch short video
 - Take notes on issues you see/hear
- ▶ Sort this out as a group

